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Please find below and/or attached an Office communication concerning this application or proceeding.

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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GROUP 1700

Application Number: 10/686,031
Filing Date: October 14, 2003
Appellant(s): CAO ET AL.

John F. Conroy
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 1/29/2007 appealing from the Office action mailed 8/10/2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct. The examiner notes that the heading I is directed to the 102 rejection over Yoon et al alone, and that headings II and III are both drawn to the 103 rejection of Yoon et al in view of Fednyshyn et al and separated out by the appellant merely for clarity.

The examiner has included the Maemoto reference, as previously argued (*see 9/9/2005 office action*), to simply clarify the arguments on appeal.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,680,157	FEDNYSHYN	1-2004
JP 2002-082441	YOON et al.	3-2002
2004/0101780	MAEMOTO	5-2004

English language machine translation of YOON et al. (JP 2002-0182441)

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 21-24 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoon et al (JP 2002-082441 in view of its English language machine translation).

Yoon et al disclose a resist comprising a lactone in the backbone, that may be a 5 or 6 membered ring, and, as exemplified on pages 9, 15, 20, and 21, comprises a tertiary carbon attached to the lactone carbonyl oxygen. This substituent may be a cage group, carbonyl, H, alkyl, hydroxyalkyl, or ester group. The material is UV sensitive.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-9, 11, 13-18, 20, 25-31 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon et al in view of Fedynyshyn (6,680,157).

Yoon et al has been discussed above, and teaches that additional monomers may be employed in the resin. Additionally, the material is UV sensitive, and any suitable method may be employed.

Fedynyshyn discloses a resist composition of EUV or electron beam exposure similar to that instantly claimed. The reference teaches that additional suitable monomers include hydroxystyrene. The reference also teaches that suitable exposure methods for such compositions are those EUV exposures in a vacuum environment as it aids to control outgassing.

Given the teachings of the references, it would have been obvious to one of ordinary skill in the art to prepare the material of Yoon et al choosing to add the advantageous PHS monomer to the composition and also to choose to expose the material and form a pattern in a vacuum environment with reasonable expectation of achieving a pattern having reduced edge roughness.

(10) Response to Argument

Firstly, Appellant has argued that the lactones in the backbone of the references of record will not undergo a ring-opening reaction upon semiconductor processing (i.e. development). However, it is well known that lactone compounds will undergo such a reaction as these compounds are known development inhibitors, and inhibit development by reacting with the developing solution to undergo a ring opening reaction. One reference which discusses this is Maemoto et al US 2004/0101780 in the second column of page 16, but this reference is not relied upon for any rejection, just as an example of the many references which demonstrate that it is well known that lactones perform in this manner. Appellant has argued that it is the side chains of the (meth)acrylic monomers of the polymers of Yoon that will react to the acid and be cleaved instead of the lactone reacting and undergoing a ring-opening reaction. The examiner notes that the material of Yoon does include an acid generator similar to the material of the instant invention ([0085]) in addition to the similar monomers/ polymers. Furthermore, in many examples, the ratio of lactone monomers in the resultant polymer is greater than that of the methacrylic monomers. Given that the lactones are present in the photoresist, it is expected that some percentage of lactone monomers will undergo ring opening reactions along with the cleaving of the side chains of the additional monomers. Appellant has not persuasively demonstrated that none of the lactones in the material of Yoon (comprising a similar polymer, similar acid generator, and being employed in a process having the same coating, exposure, and development steps as the instant invention) will react with the photoacid generator present in Yoon's material. Furthermore, the Yoon reference teaches lactones in the polymer backbone meeting the instant claims in combination with monomer such as maleic anhydride, and no (meth)acrylate monomers, thus it appears that it would be the lactone reacting in that instance. It is noted that while the applicant is arguing that the mechanism would be different, the claims simply require that there be present a lactone as described in the instant claims in the polymer backbone, and now, additionally a styrene. Therefore, the examiner maintains her position that the lactone compounds in the backbone of the Yoon et al resin will inherently undergo a ring opening reaction upon semiconductor processing, and the rejections of record are maintained.

Additionally appellant has argued that the Yoon reference fails to teach the solubility switching of the photoresist in developer. In semiconductor processing, it is typical for a photoresist layer to be aqueous soluble until exposed to light, usually through a mask, which cause the solubility of the portions of that layer to become more or less soluble to aqueous solution (i.e. developing solutions). This is standard, and how a resist pattern is formed. Regardless of whether or not the Yoon et al reference discusses this in depth, it is clearly contemplated and taught by the reference in its specification when discussing coating, exposure, and development. Also, given the close similarity of the materials and methods, one of ordinary skill in the art would expect this solubility switch, and according to the MPEP:

The prima facie case of obviousness is not undermined simply because applicant's motivation differs from the prior art's motivation. In re Dillon, 919 F.2d 688, 692-93, 16 USPQ2d 1897, 1901 (Fed. Cir. 1990) (in banc), cert. Denied, 500 U.S. 904 (1991).

Appellant has also argued that the Yoon reference failed to teach the presence of a styrene, and that the Fednyshyn reference teaches away from the instant invention, and that the examiner has erred by stating that the Fednyshyn reference may be relied upon for some teachings of conventional additives or methods instead of taking the reference's teachings as a whole. The examiner has stated that the Fednyshyn reference is solely cited for its teaching that styrenes are common co-monomers with maelic anhydrides, acrylates and methacrylates, and for its teaching that it is known to expose EUV resists in a vacuum, not for its complete polymer. The Yoon reference teaches that any common co-monomers may be included and teaches that (meth)acrylates are preferred, thus it would have been obvious to one of ordinary skill in the art to prepare the material of Yoon adding a (meth)acrylate and/ or common co-monomers, therefore that argument is unpersuasive. In light of the teachings of the references, the rejections of record are maintained.

Finally, the examiner may look to a reference for a teaching of a conventional feature such as types of co-monomers, additives, and/ or conventional and beneficial steps such as performing the UV exposure in a vacuum rather than not. As discussed above, the reference demonstrates clearly that it is well know in the art to employ styrenes in combination with maelic anhydride monomers giving one of ordinary skill in the art motivation to employ that combination, as well as the perform the EUV exposure of the material of Yoon in a vacuum as it is well known that the EUV exposure step of a method may be performed in a vacuum *on any EUV sensitive material and not solely the material of Fednyshyn.* Therefore, the examiner's reliance on the teachings of well known variations of exposure steps and known combinations of monomers is appropriate and the rejection is maintained.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Quality Assurance Specialist, TC 1700

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AMANDA WALKE
PRIMARY EXAMINER